Winter Weather WES Case Scenario:
31 January - 1 February 2008

Simulation 1: St. Louis, MO County Warning Area Winter Weather Watch Phase

This simulation focuses on the challenge of recognizing the scope of the heavy snow potential in the St. Louis, MO (LSX) County Warning Area (CWA). You are working a midnight shift at WFO St. Louis, MO and the start time for this simulation is 0500 UTC 30 January 2008. Previous shifts have recognized that there is considerable agreement that a major winter storm would affect at least a portion of the LSX CWA. However, between the deterministic models, uncertainty existed in the track of the mass fields and QPF. Your job is to determine if you would like to issue a Winter Storm Watch for all or portions of the LSX CWA for the event.

Simulation 1 will focus on identifying synoptic-scale and mesoscale processes, the application of a conceptual model, and past research to assist the forecaster in determining where the axis of heaviest snow will occur.

The simulation should take about a hour to complete.

(30 min): Deterministic and SREF ensemble analysis.
(10 min): Overview of Goree/Younkin/Browne Technique.
(5 min): HPC product review.
(15 min): Issue winter weather products.

(30 min): Deterministic and SREF ensemble analysis.

While analyzing the deterministic and ensemble model output, keep in mind the meteorological conditions that should be in place when the Goree/Younkin/Browne (GYB) Technique is most successful.

1a. What are the main surface, mid-level, and upper-level features that will impact the LSX CWA after 1200 UTC 31 January 2008?

1b. What synoptic-scale and mesoscale features/processes are going to contribute to the development of heavy snowfall?

2. How do the deterministic models compare to the LSX CWA heavy snow conceptual model (Fig. 1)?

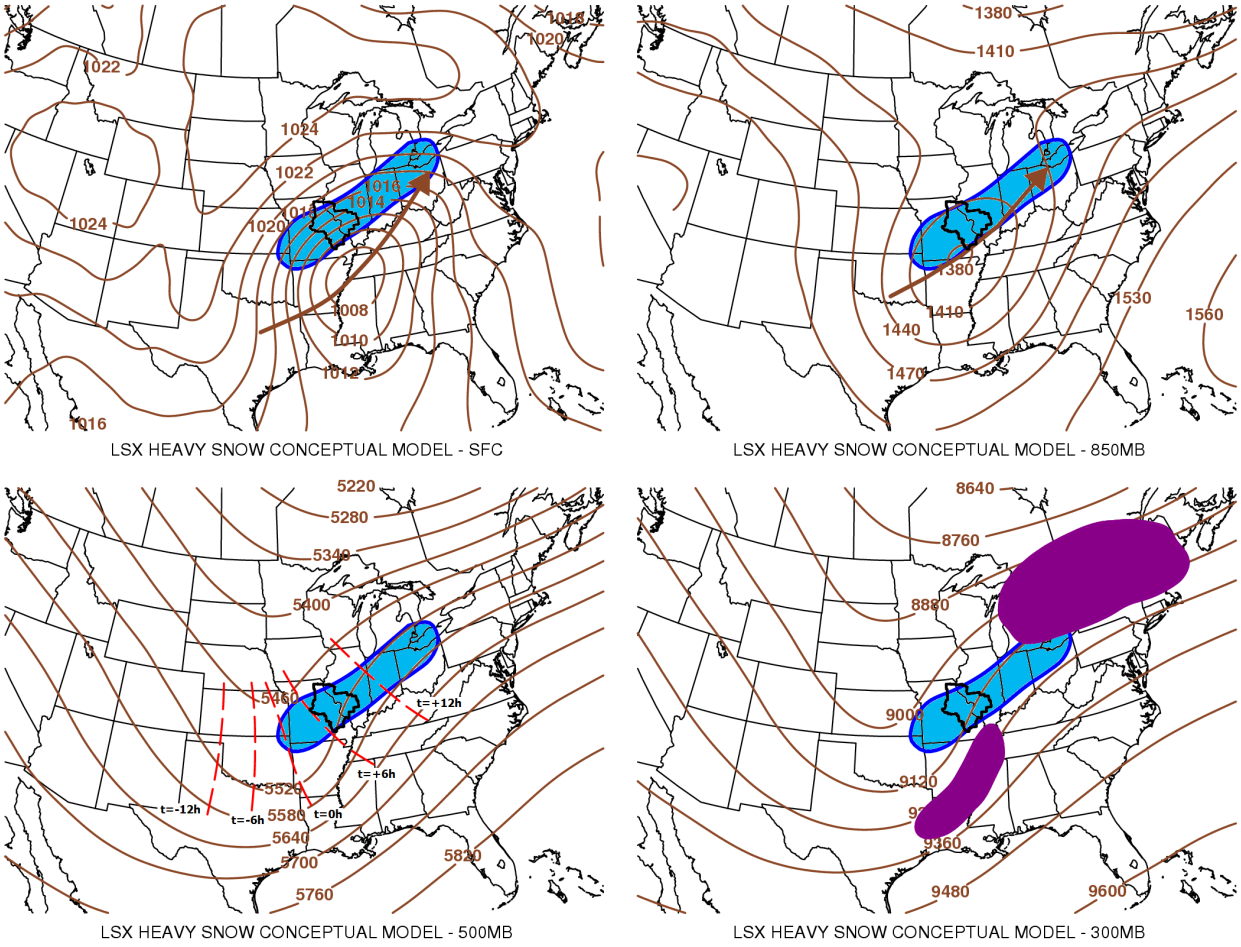


Fig. 1. LSX CWA heavy snow conceptual model. MSLP with track [brown, mb], top left; 850mb HGHT with track [brown, m], top right; 500mb HGHT [brown, m] with trough progression [red, dashed], bottom left; and 300mb HGHT [brown, m] with jet cores [purple, shaded], bottom right. Area of heaviest snow is shaded [blue] in each panel.

3. Based on the model output, should there be heightened concern for warning criteria snowfall ($\geq$6") within the LSX CWA? Why or why not?

4. Using the SREF, which mass fields have the most variability with the track of the system? Does the envelope of potential solutions still present a heavy snowfall concern for the LSX CWA?

5. Using the SREF precipitation probability images (Fig. 2) and a climatological snow-liquid-ratio (12:1), what are the chances that the LSX CWA reaches warning-criteria snowfall? Does this guidance conflict with the LSX CWA conceptual model for heavy snowfall?

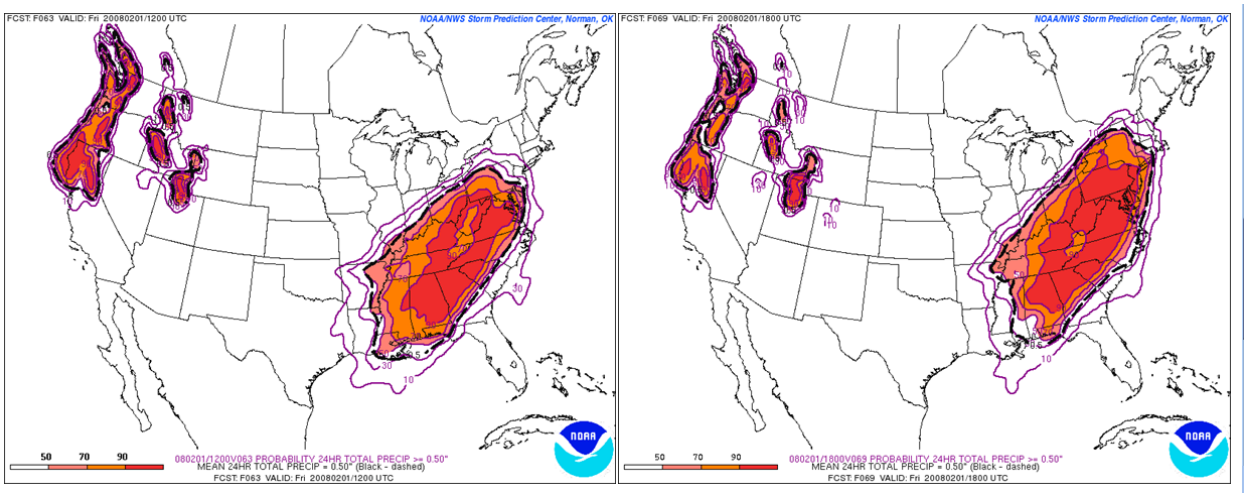


Fig. 2. SREF 63-h (left) and 69-h (right) forecast of probability of 24-h precipitation $>$ 0.5" [shaded] and mean 24-h precipitation 0.5" [black dashed] valid at 1200 (left) and 1800 (right) UTC 01 February 2008.

(10 min): Review of Goree/Younkin/Browne Technique.

6. During this portion of the simulation, you should review the research of Goree and Younkin (1966) and Browne and Younkin (1970). The following is a summary of the GYB Technique. This is for reference only, application of this technique will be completed at the end of the simulation.

Goree/Younkin/Browne Technique

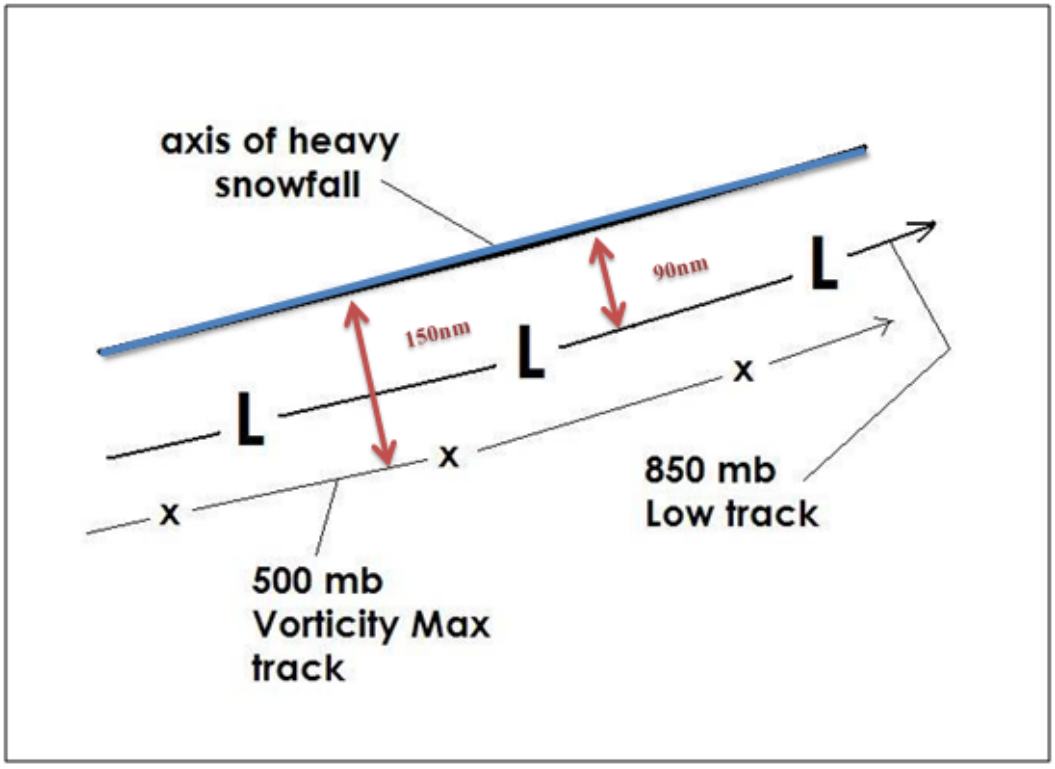
Step 1: Plot the track of the 850mb low pressure. Draw a parallel line 90 nm to the cold side of the track.

Step 2: Plot the track of the 500mb vorticity maximum. Draw a line parallel to this track and 2.5 degrees of latitude (150nm) to the cold side of the track.

Step 3: Evaluate the location of the -5°C 850mb temperature compared to the tracks plotted in Steps 1 and 2.

Step 4: Assess the warm air advection, lift and moisture available along the track over time.

Step 5: Based on the results of Steps 1 through 4, determine the axis of heaviest snowfall and the relative intensity along the track.



(5 min): HPC internal winter weather product review.

7. HPC Winter Weather Desk deterministic snow forecasts have just been issued (Fig. 3). What are the major differences between the current and previous HPC deterministic snow forecast?

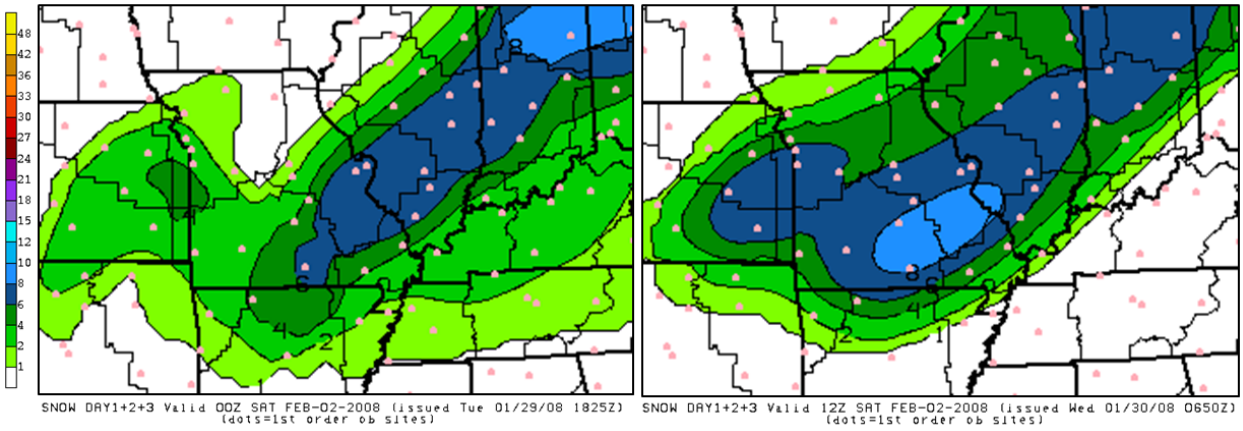


Fig. 3. HPC Winter Weather Desk deterministic forecasts issued at 1825 UTC 29 January 2008 and 0650 UTC 30 January 2008.

(15 min): Issue winter weather products.

8. After an analysis of the deterministic and ensemble model output, would the GYB Technique properly work in this case? Why or why not? Please use the following checklist to assist in your response.

For this technique to properly work, you should have:

1. A 500mb vorticity maxima that is moving northeast.
2. A deepening/occluding surface low pressure system.
3. A discernible 850mb low center that tracks northeast and deepens with time.
4. Thermal profile is conducive for snowfall and moisture is available.

9. Using the provided 850mb low center composite chart from the 0000 UTC 30 January 2008 model runs (Fig. 4), draw a "mean" 850mb low track. Next, using the GYB Technique draw in the approximate axis of heaviest snow.

Goree/Younkin/Browne Technique

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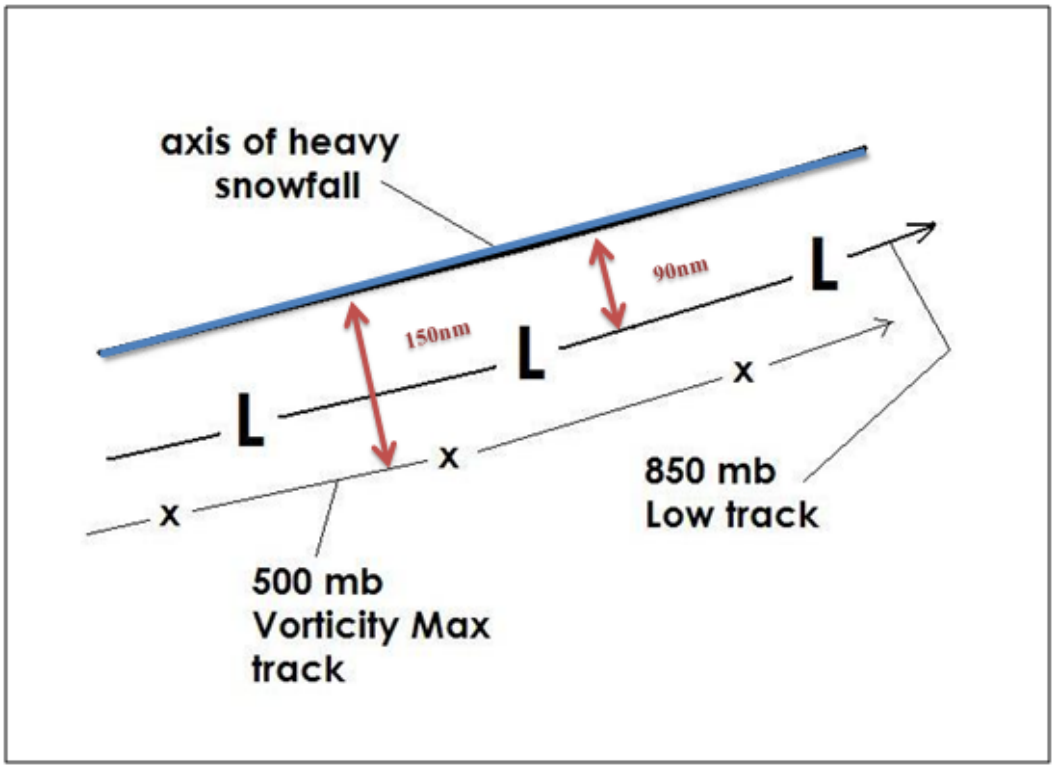

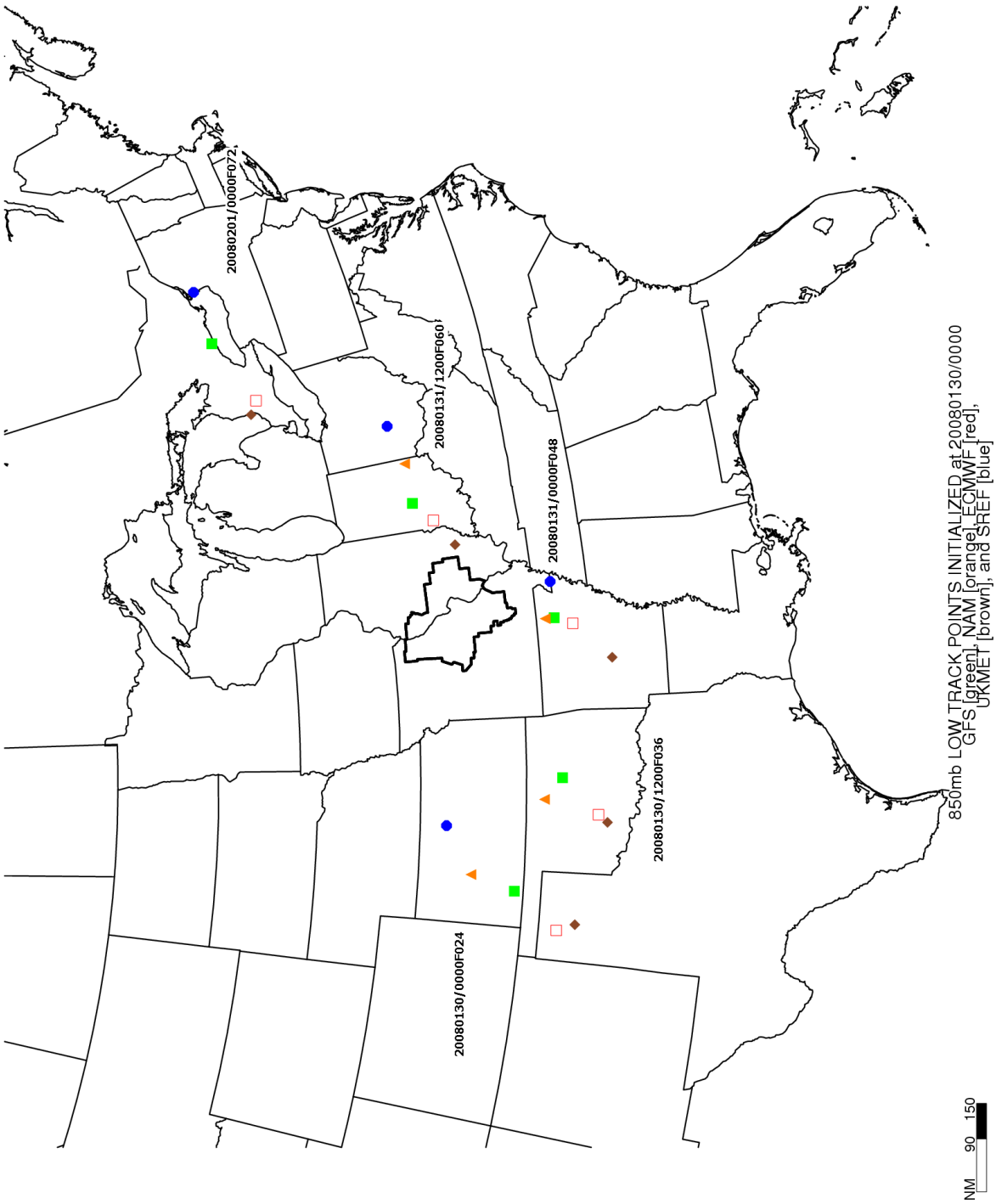

Fig. 4. 850mb low centers initialized at 0000 UTC 30 January 2008 and valid for F024, F036, F048, F060, and F072. GFS [green squares], NAM [orange triangles], ECMWF [red squares], UKMET [brown diamonds], and SREF [blue octagons].

10. Using the provided 500mb vorticity center composite chart from the 0000 UTC 30 January 2008 model runs (Fig. 5), draw a "mean" 500mb vorticity maximum track. Next, using the GYB Technique draw in the approximate axis of heaviest snow.

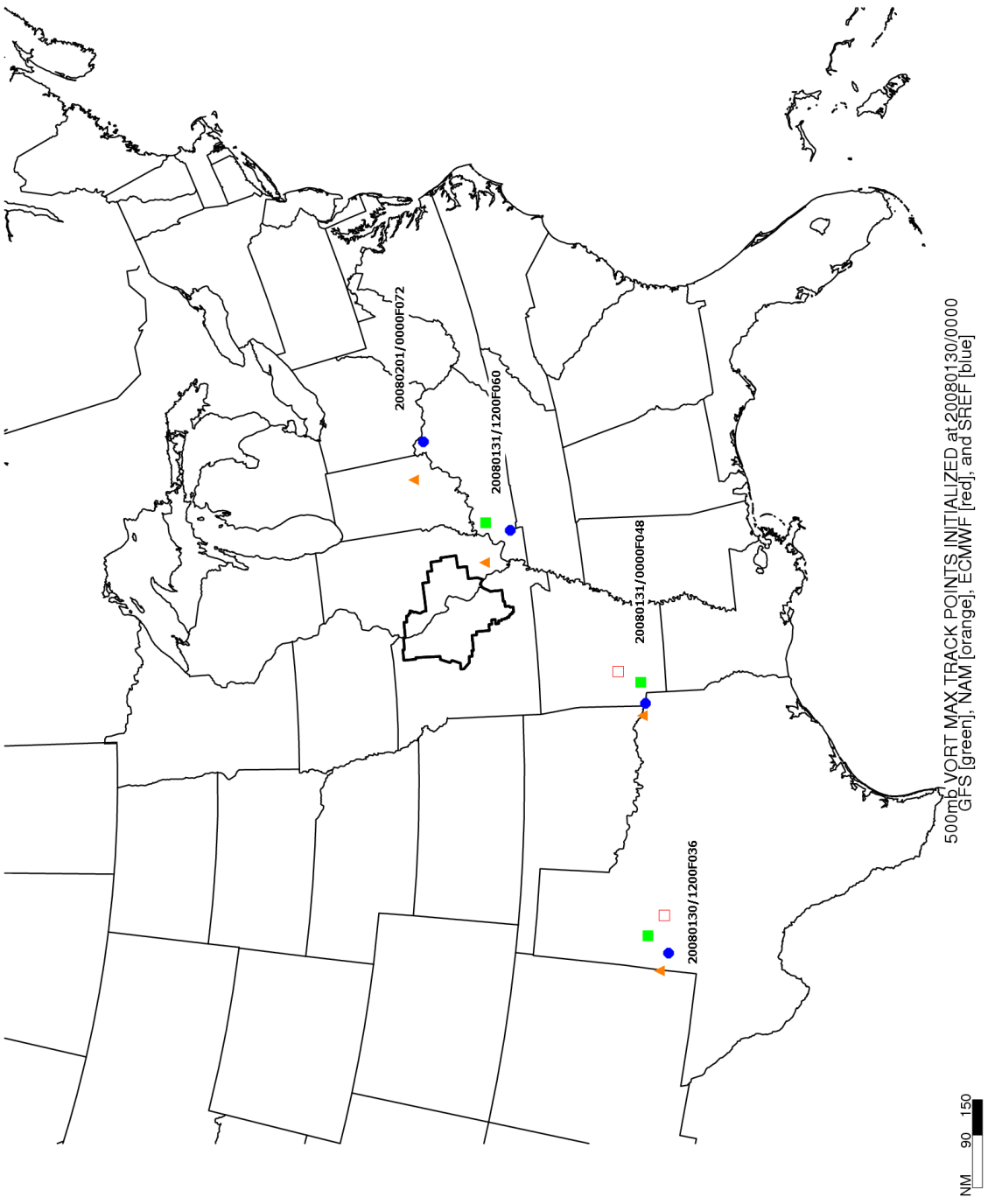

Fig. 5. 500mb vorticity maximum centers initialized at 0000 UTC 30 January 2008 and valid for F036, F048, F060, and F072. GFS [green squares], NAM [orange triangles], ECMWF [red squares], UKMET [brown diamonds], and SREF [blue octagons].

(10 min): Issue winter weather products.

11. Using the guidance that was presented in this simulation, should all or a portion of the LSX CWA be included within a winter storm watch? Use the LSX CWA map (Fig. 6) to shade the counties to be included in the watch and draw forecast snowfall amounts.

Winter Storm Watch: A watch is used when the risk of hazardous winter weather has increased significantly, there is a strong possibility it will reach warning criteria, and falls in the 12 to 48 hour portion of the forecast.

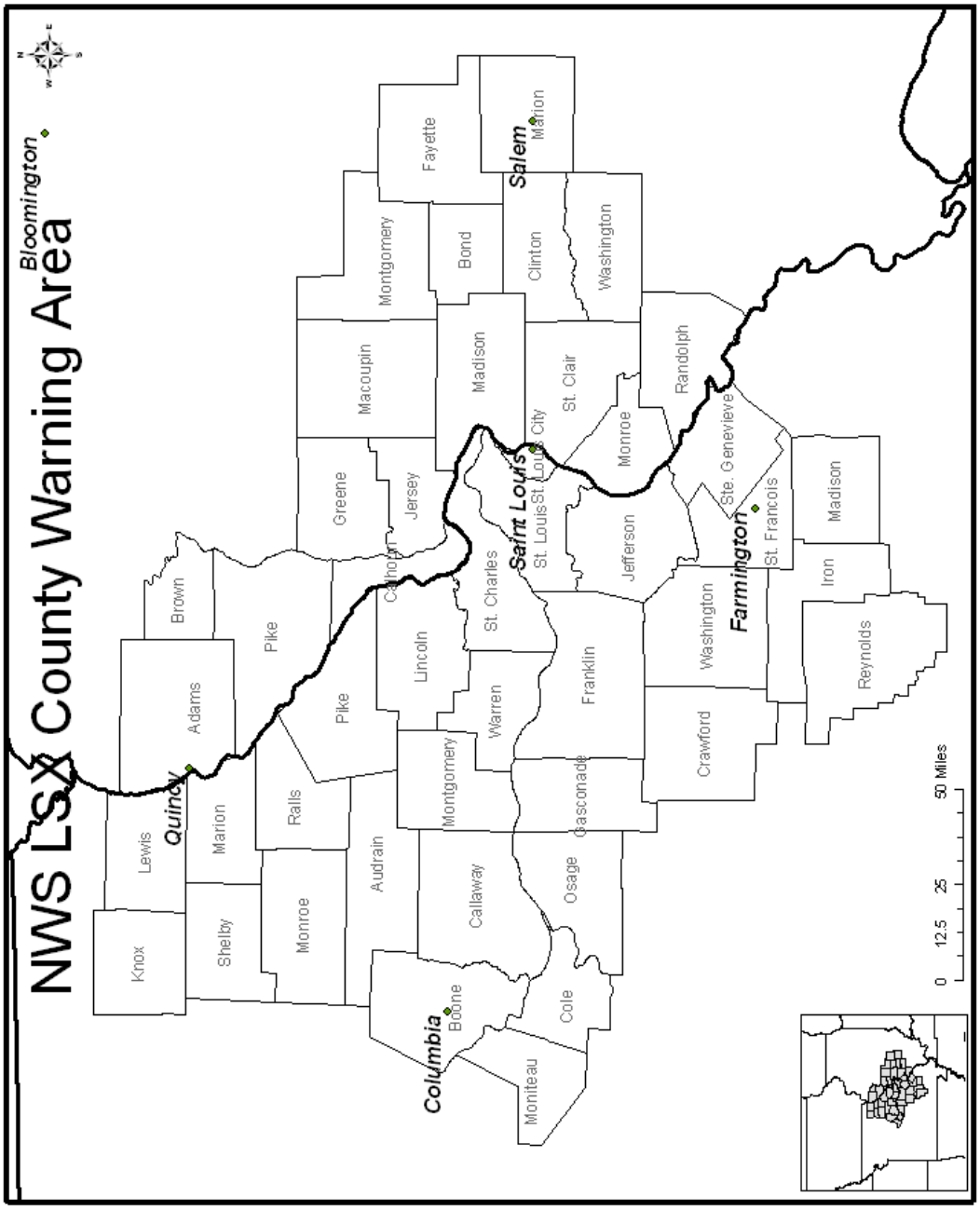

Fig. 6. St. Louis, MO (LSX) CWA county warning map.